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Psycho-Social Correlates of Opioid Use Disorder among the US Adult Population: Evidence from the National Survey on Drug Use and Health, 2015–2018

Mohammad Rifat Haider[a], **Monique J. Brown**[b,c], **Rajat Das Gupta**[b], **Sabrina Karim**[b], **Bankole Olatosi**[d], **Xiaoming Li**[c,e]

[a]Department of Social and Public Health, College of Health Sciences and Professions, Ohio University, Athens, Ohio, USA;

[b]Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA;

[c]South Carolina SmartState Center for Healthcare Quality, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA;

[d]Department of Health Services Policy and Management, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA;

[e]Department of Health, Promotion, Education and Behavior, Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

Abstract

Background: The United States (US) has experienced an opioid epidemic over the last two decades. Drug overdose deaths increased by 21% from 2015 to 2016, with two-thirds of these deaths attributed to opioid use disorder (OUD). This study assessed the psycho-social correlates associated with OUD over 2015–2018 in the US.

Methods: This study used data collected from 171,766 (weighted = 245,838,163) eligible non-institutionalized US adults in the pooled National Survey on Drug Use and Health from 2015–2018. Survey-weighted descriptive, bivariate, and multivariable analyses were performed to assess the psycho-social correlates of OUD.

Results: About 0.85% of the respondents reported having OUD in the past year. About one-quarter (26.3%), one-sixth (14.8%), and half (47.3%) of the respondents with OUD reported

CONTACT Mohammad Rifat Haider haider@ohio.edu Grover Center W333, 1 Ohio University Drive, Athens, OH 45701, USA.

Author contributions

MRH had full access to the data used in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. All authors contributed in conceptualization of the study and study design, MRH acquired the data, MRH and SK performed statistical analysis, RDG conducted the literature review, MRH and RDG wrote the first draft, MJB, SK, BO, and XL contribute in finalizing the manuscript. All authors read and approved the final draft.

Declaration of interest

The authors report no conflicts of interest.

Data availability statement

The data that support the findings of this study are openly available in Substance Abuse & Mental health Data Archive (SMHDA) at https://www.datafiles.samhsa.gov/study-series/national-survey-drug-use-and-health-nsduh-nid13517.

alcohol, marijuana, and nicotine dependence, respectively. One-sixth (16.7%) had a criminal justice involvement history, and almost one-third (30.8%) experienced a major depressive episode (MDE) in the past year. In multivariable analysis, ≤64 years, White race, male gender, lower educational attainment, unemployment, large metro area residence, history of alcohol, marijuana, nicotine use disorder, history of criminal justice involvement, and MDE in previous year were associated with higher odds of OUD. In contrast, being married, non-Hispanic African American, non-Hispanic Other, and Hispanic ethnicity, good physical health, private health insurance, and higher risk perception about addictive substance use were associated with lower odds of OUD.

Conclusions: OUD is more prevalent among certain sociodemographic groups in the US. Targeted interventions focusing on young, White, unmarried, male, and uninsured/Medicaid/Medicare populations should be implemented to reduce the OUD.

Keywords

Opioid use disorder; major depressive episode; alcohol use disorder; marijuana use disorder; nicotine dependence; criminal justice involvement; USA

Introduction

Opioid, a class of drugs primarily used for managing pain, is one of the most commonly prescribed drugs in North America (Kuehn, 2007). However, opioid is safe when used for a short period and its addictive properties (producing euphoria) make these perfect drugs for misuse (National Institute of Drug Abuse (NIDA), 2020). Opioid misuse can culminate into opioid use disorder (OUD), which is a serious public health issue in the US (Volkow et al., 2014). According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), OUD is defined on the basis of 11 diagnostic criteria for opioid dependence or abuse, which includes withdrawal, tolerance, use in dangerous situations, trouble with the law, and interference with major obligations at work, school, or home (American Psycholgical Association (APA), 1994). OUD coupled with other sedatives/hypnotics or alcohol can lead to respiratory suppression (Connery, 2015). OUD is also positively associated with alcohol and other illicit drug abuse (Ling et al., 2011).

High prevalence of OUD coupled with its negative health outcomes is one of the major public health issues in the US today (Gomes et al., 2018). Since the 1990s, prescription opioid misuse has increased almost three-fold in the US (Hall et al., 2008). In 2017, 11.4 million people misused prescription opioids and 886 thousand people used heroin, while 2.1 million people suffered from OUD in the US (HHS.gov, 2019). Studies show young and middle-aged adults are primarily affected by the opioid epidemic. The overall death rate due to OUD increased by 15.6% from 2014 to 2015, with more pronounced increases occurring among males, those aged 25–44 years, and non-Hispanic Whites (Rudd et al., 2016). OUD also imposes a huge economic burden (Florence et al., 2016). In 2016, 1,681,359 years of potential life lost in the US were attributed to OUD (Gomes et al., 2018). It also places significant burden on the health system resources and health financing (Meyer et al., 2014).

Considering the burden of OUD in the US, it is important to examine and identify the psycho-social determinants of OUD. We hypothesized that sociodemographic

characteristics, for example, age, gender, race/ethnicity, education, employment, as well as psycho-social factors such as other substance use disorders and depression history in last year preceding the survey, e.g., history of alcohol and marijuana use disorder, nicotine dependence, and major depressive episode (MDE) are associated with OUD in the US. This study aimed to assess those associations. Updated findings on the psycho-social determinants of OUD will help policymakers, state health departments, healthcare practitioners and researchers identify high-risk groups for targeted OUD interventions. Since few studies exist that examine psycho-social correlates of OUD among US adult populations using nationally representative datasets in the US, this study will help to fill this research gap in the scientific literature.

Methods

Data source

This study used the pooled National Survey on Drug Use and Health (NSDUH) data from 2015–2018. The NSDUH is a nationally representative cross-sectional survey of the non-institutionalized population in the US conducted annually by the Substance Abuse and Mental Health Services Administration (SAMHSA). The NSDUH collects data on the use of alcohol, tobacco, illicit drugs and other substance use and misuse, perceived risk from substance use, mental illnesses, major depressive episodes (MDE), substance use disorders, and utilization of a variety of substance use and behavioral health treatments (SAMHSA, 2018). Detailed data collection methods, survey design and sampling, and response validity can be found elsewhere (SAMHSA, 2018).

Since this study focused on exploring the psycho-social determinants of OUD among the adult US population, the study sample included, on average, 42,942 eligible non-institutionalized US civilians aged ≥18 years each year [N = 171,766 in the 4-year period]. All estimates were weighted to account for NSDUH's complex survey design and the nationally representative weighted pool includes 245,838,163 adults.

Dependent variable

The NSDUH was partially redesigned in 2015 to include the term "use disorder" instead of "dependence or abuse" for various substance use disorders, including OUD. Therefore, OUD was examined using the 2015–2018 data only. In 2015–2018 surveys, respondents were classified as having a past year opioid use disorder if they had either a heroin use disorder (i.e. dependence or abuse), or pain reliever use disorder related with their misuse of prescription pain relievers in the past year, or if they had both (Edwards et al., 2017). Respondents were also asked about any symptoms of OUD during the past year. OUD was operationalized using the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria for dependence (≥3 of 7) or abuse (≥1 of 4) during the 12-months preceding the survey (American Psycholgical Association (APA), 1994).

Independent variables

Survey-weighted descriptive, bivariate analyses and logistic regression, adjusting for age, gender, race/ethnicity, education, employment, residence, health insurance status, physical

health status, history of criminal justice involvement, risk perception on addictive substance use, history of alcohol and marijuana use disorder, nicotine dependence, and MDE in the past year (yes, no), were performed to assess the determinants of OUD.

Based on the DSM-IV criteria (American Psycholgical Association (APA), 1994), MDE in the NSDUH was defined as a period of at least two weeks when the individual experienced a depressed mood or loss of interest or pleasure in daily activities and other additional symptoms. Alcohol and marijuana use disorder history was elicited by asking the respondents whether they had any use disorder of alcohol and/or marijuana in the past year. Nicotine dependence in past 30 days was assessed using the Nicotine Dependence Syndrome Scale (Shiffman et al., 2004). An index depicting a respondent's perception on the risk potential of using 6 addictive substances in different frequencies (e.g. 4/5 drinks nearly daily, 5 or more drinks once or twice a week, smoking one or more pack of cigarettes daily, smoking marijuana once a month, smoking marijuana once or twice a week, trying heroin once or twice, using heroin once or twice a week, trying LSD once or twice, using LSD once or twice a week, using cocaine once a month, using cocaine once or twice a week) was created using principal component analysis. Based on the principal component score, the respondents were categorized into four groups (coded 1 = No risk, 2 = slight risk, 3 = moderate risk, 4 = great risk). We recoded respondents' ratings of their overall health as 1 = excellent, very good, or good or 0 = fair or poor. History of criminal justice involvement in the past 12 months was generated by combining two items: the number of times the respondent "stole or tried to steal anything worth >$50.00" and "attacked someone with the intent to hurt them," (coded 0 = none or 1 = any) (Griesler et al., 2019).

Data analysis

For descriptive statistics, we measured the frequency and percentage of respondents who had OUD in past year. Bivariate analysis was performed using the unadjusted logistic regression models with OUD as the outcome variable and other covariates as the exposure variables. Survey-weighted logistic regression model was used for multivariable analysis of factors associated with OUD in the US adult population. All analyses were performed with STATA 16.0 (StataCorp, 2019).

Results

Characteristics of the respondents and respondents with OUD compared with no OUD

About 0.85% of the respondents reported having OUD in the past year during the study period. Among respondents (weighted N = 245,838,163), the majority were female (51.8%), non-Hispanic White (64.1%), married (51.9%), full-time employed (49.4%), resided in a large metro area (55.9%), and had private health insurance (64.9%); while, 25.4% were 50–64 years old, 31.3% were college graduates or had a higher degree, and 37.6% had an annual household income of ≥$75,000 (Table 1).

Among respondents with OUD (weighted N = 2,082,068), the majority were male (59.1%), non-Hispanic White (72.5%), never been married (50.1%), resided in a large metro area (52.7%), and insured through Medicaid/CHIP (30.2%); while, 27.9% were 35–49 years old,

41.1% had full-time employment, 34.0% were some college or associate degree holders, and 32.1% had an annual household income of $20,000–$49,999 (Table 1).

Among the respondents with no OUD, the majority were female (51.9%), non-Hispanic White (64.0%), married (52.2%), resided in a large metro area (55.9%), and had health insurance (90.3%); whereas, 25.4% were 50–64 years old, 31.3% were a college graduate or had a higher degree, 49.5% had full-time employment, 64.9% had private health insurance, and 37.8% had an annual household income of ≥$75,000.

About 26.3% of the respondents with OUD reported having alcohol dependence/abuse in the past year compared with only 5.8% of respondents without OUD; while 14.8% of the respondents with OUD reported having marijuana use disorder in the past year compared with only 1.3% of the respondents without OUD. Similarly, 45.1% of respondents with OUD perceived no risk was involved with addictive substance use, whereas, only 9.3% of those who perceived that addictive substance use poses a great risk reported having OUD. Almost half (47.3%) of the respondents with OUD had nicotine dependence, while only 7.2% of the respondents without OUD reported nicotine dependence. One-sixth (16.7%) of the respondents with OUD reported a history of criminal justice involvement in the preceding year, while only 1.3% of the respondents without OUD reported so. More than a quarter (28.8%) of the respondents with OUD had MDE in the past year compared with only 6.8% of the respondents with no OUD.

Results of bivariate analysis

In bivariate analysis, we found that respondents with a history of alcohol use disorder (Odds Ratio [OR] = 5.82, 95% Confidence Interval [CI] = 5.00–6.78) compared with no history of alcohol use disorder in the past year; a history of marijuana use disorder (OR = 13.04, 95% CI = 10.62–16.01) compared with no history of marijuana use disorder in the past year; nicotine dependence (OR = 11.64, 95% CI = 10.08–13.45) compared with no nicotine dependence in the past month; a history of criminal justice involvement (OR = 15.37, 95% CI = 13.15–17.96) compared with no history of criminal justice involvement in the past year; a history of MDE (OR = 5.58, 95% CI = 4.83–6.46) compared with no history of MDE in the preceding year had higher odds of reporting OUD (Table 2). Moreover, younger age was associated with higher odds of reporting OUD, 18–25 years (OR = 8.42, 95% CI = 4.74–14.95), 26–34 years (OR = 10.66, 95% CI = 5.96–19.01), 35–49 years (OR = 6.91, 95% CI = 3.86–12.39), 50–64 years (OR = 5.28, 95% CI = 2.92–9.53) compared with ≥65 years old. In addition, respondents who were men (OR = 1.55, 95% CI = 1.36–1.77) compared with female; had less than a high school education (OR = 3.41, 95% CI = 2.63–4.41), high school education (OR = 3.05, 95% CI = 2.32–4.01), some college/associate degree (OR = 2.52, 95% CI = 1.92–3.30) compared with college graduate or higher degree holders; unemployed (OR = 3.73, 95% CI = 3.13–4.44) compared with full-time employed; annual household income <$20,000 (OR = 3.14, 95% CI = 2.54–3.88), $20,000–$49,999 (OR = 1.79, 95% CI = 1.45–2.21), and $50,000–$74,999 (OR = 1.41, 95% CI = 1.13–1.77) compared with respondents with annual household income ≥$75,000; had no health insurance (OR = 3.50, 95% CI = 2.86–4.29), Medicaid/CHIP (OR = 5.35, 95% CI = 4.60–6.22), Medicare (OR = 1.71, 95% CI = 1.26–2.31), other health insurance (OR = 2.85, 95%

CI = 1.92–4.24) compared with those who had private health insurance had higher odds of reporting OUD. Whereas, respondents who were non-Hispanic Other (OR = 0.56, 95% CI = 0.44–0.70), Hispanic (OR = 0.65, 95% CI = 0.50–0.84) compared with non-Hispanic White; married (OR = 0.29, 95% CI = 0.24–0.34), and widowed/separated/divorced (OR = 0.66, 95% CI = 0.55–0.80) compared with never-married; having good physical health (OR = 0.38, 95% CI = 0.32–0.45) compared with bad physical health; and having slight (OR = 0.50, 95% CI = 0.42–0.60), moderate (OR = 0.31, 95% CI = 0.25–0.38), great (OR = 0.12, 95% CI = 0.10–0.16) risk perception about drug dependence compared with those who perceived no-risk involved with drug dependence had lower odds of reporting OUD.

Multivariable analysis

Survey-weighted logistic regression results showed that respondents who had MDE had higher odds of having OUD compared with respondents with no MDE (adjusted Odds Ratio (aOR) = 2.31; 95% CI = 1.88–2.87) (Table 2). Respondents who had a history of alcohol use disorder were more likely to have OUD than those who had no such history (aOR = 2.06; 95% CI = 1.67–2.54). Respondents who had a history of marijuana use disorder were more likely to have OUD than those who had no such history (aOR = 3.38; 95% CI = 2.62–4.37). Respondents who used nicotine and had nicotine dependence were more likely to have OUD than those who did not have nicotine dependence (aOR = 4.44; 95% CI = 3.67–5.37). Respondents who had a history of criminal justice involvement were more likely to have OUD than those who had no such history (aOR = 4.74; 95% CI = 3.84–5.85).

Higher odds of having OUD was associated with 26–34 years (aOR = 3.83, 95% CI = 1.86–7.85), 35–49 years (aOR = 3.60, 95% CI = 1.82–7.11), 50–64 years (aOR = 3.10, 95% CI = 1.60–6.01) compared with ≥65 years old; male (aOR = 1.29; 95% CI = 1.11–1.48) compared with female; less than a high school education (aOR = 1.48, 95% CI = 1.50–2.08), high school education (aOR = 1.50, 95% CI = 1.07–2.09), some college/associate degree (aOR = 1.43, 95% CI = 1.05–1.94) compared with college or higher degree; and unemployed (aOR = 1.58, 95% CI = 1.27–1.96)compared with full-time employed; large metro residents (aOR = 1.26, 95% CI = 1.06–1.50) compared with non-metro residents; had no health insurance (aOR = 1.62, 95% CI = 1.27–2.06), Medicaid/CHIP (OR 2.20, 95% CI = 1.80–2.69), Medicare (OR = 1.51, 95% CI = 1.00–2.29), other health insurance (OR = 1.91, 95% CI = 1.20–3.05) compared with those who had private health insurance.

In contrast, lower odds of having OUD included non-Hispanic African American (aOR = 0.66, 95% CI = 0.47–0.92), non-Hispanic other (aOR = 0.60, 95% CI = 0.45–0.80), Hispanic (aOR = 0.61, 95% CI = 0.45–0.83) compared with non-Hispanic White; married (aOR = 0.67, 95% CI = 0.54–0.84) compared with never-married; having good physical health (aOR = 0.65, 95% CI = 0.52–0.82) compared with bad physical health; and having slight (aOR = 0.67, 95% CI = 0.55–0.82), moderate (aOR = 0.57, 95% CI = 0.45–0.72), or great (aOR = 0.33, 95% CI = 0.24–0.44) risk perception about addictive substance use compared with perceiving no-risk involved with addictive substance use.

Discussion

Main findings and interpretations

This study found that US adults who were younger, White, male, unemployed, had lower educational attainment, had past-year marijuana, and alcohol use disorder, past-month nicotine dependence, past-year criminal justice involvement, and had MDE in the past year were more likely to report having OUD. However, respondents who were married, non-Hispanic African American and other races, Hispanic ethnicity, and had slight, moderate or greater risk perception about using addictive substances compared with perceiving no-risk had lower odds of reporting OUD.

This study found that the respondents aged 26–64 were more likely to have OUD than older people (≥65 years old). This is in agreement with the current trend shown from NSDUH data that the uses of both non-prescription opioid (e.g. heroin) and prescription opioid (e.g. oxycontin) have been declining among teenagers (12 to 17 years) (Johnston et al., 2019), while prescription opioid use is highest among the adult population (≥26 years). Majority of those with OUD reported starting opioid misuse in their early 20 s, which may culminate into OUD later in their life (NASEM, 2017).

Another study found that non-Hispanic African American and Other races, and Hispanic populations were less likely to misuse opioids compared with non-Hispanic Whites. This trend of misuse of drugs, especially opioids, contributed to the recent decline in the life expectancy of White populations in the US (Case & Deaton, 2015). The social context and market regulation policy of the US increases the accessibility of White populations to prescription opioids, which in turn, provides an environment that can facilitate long term misuse of the drug (Hansen & Netherland, 2016).

Lower educational attainment was significantly associated with OUD. This is concordant with the findings of previous studies (Ho, 2017; Hollingsworth et al., 2017; Zhou et al., 2018). Populations with lower educational attainment tend to be involved in manual labor, which can increase the risk of workplace injury and chronic health conditions, that may increase their chances to be prescribed or use opioid medications (Bohnert et al., 2011; Ho, 2017). Further, this population may also be involved in activities like seeking opioid prescriptions from multiple physicians, to maximize their profit by selling the drugs (Ho, 2017; Keyes et al., 2014). Moreover, individuals with lower educational attainment have poor access to rehabilitation and addiction management programs, less social network support and less financial resources, that also increases their likelihood of OUD (Ho, 2017).

Similar to previous studies, this study found that a history of alcohol use disorder and/or MDE is associated with OUD (Garnier et al., 2009; Soyka, 2015). Fiellin et al. found that the progression of OUD in young adulthood follows exposure to alcohol during adolescence – known as the “gateway” model (Fiellin et al., 2013). Also, people with a history of alcohol use may experience chronic pain as a result of fights and falls, which may lead them to opioid use (Edwards et al., 2017).

In the current study, marijuana use disorder was also found to be associated with higher odds of OUD. Similarly, a prospective study that followed up more than 33,000 people and showed that marijuana use increased non-medical prescription opioid use and OUD (Olfson et al., 2018). Since heroin and tetrahydrocannabinol (THC) have similar effect on dopamine transmission through the mu opioid receptor (Tanda et al., 1997), it was found that young rats which were exposed to THC developed heroin self-administration as adults (Ellgren et al., 2007). Moreover, due to its relative availability and recent legalization in different states, marijuana can act as a gateway drug for other substance use, such as, heroin and cocaine (Hall & Lynskey, 2005).

We also found that nicotine dependence was associated with higher odds of OUD among US adults. In a prospective study conducted in Norway among 12,484 men and 15,894 women aged 30–75 years found that repeated prescription frequency of opioids was higher for men and women with a history of smoking (Skurtveit et al., 2010). One recent study showed that current smokers among young adults (18–25 years) were more likely to use/misuse prescription opioids (Romberg et al., 2019). Nicotine dependence and OUD is particularly a worse combination because smokers who have OUD may be less adherent to varenicline (medication for smoking cessation) due to the interaction between nicotine and opioid receptors (Martin et al., 2019).

The study findings showed that history of criminal justice involvement had a strong association with OUD. Crime and opioid misuse tend to occur together (Hammersley et al., 1989) and the relationship between delinquent behavior and OUD is more pronounced among adolescents and young people (Koh et al., 2017; McCauley et al., 2010). Similarly, OUD among adults also shows a positive association with the history of criminal justice involvement.

The positive association between MDE and OUD in the current study is consistent with the previous literature (Grattan et al., 2012; Smith et al., 2017; Sullivan, 2018). A review article showed that depressed patients are more likely to become chronic users of opioids. Frequent opioid overuse related to insomnia and stress has also been observed in depressed patients (Sullivan, 2018).

This study found that marriage and having good physical health lowered the odds of OUD. This finding is in agreement with findings from previous studies, which showed marriage as a protective factor against illicit drug use including OUD (Merline et al., 2004; Moos et al., 2002; Yamaguchi & Kandel, 1985). Marriage may play a role in positive treatment outcome, assessed using addiction severity index capturing last 30-days addiction to alcohol and other drugs, in individuals already suffering from OUD (Moos et al., 2002). Since the most commonly cited cause for opioid use is physical pain (Han et al., 2017), it is not surprising that good physical health condition is associated with lower chance of OUD.

In this study we explored the risk perception of six different drugs using an index, and its effects on the OUD. It is expected that the greater awareness about drug dependence would deter individuals from opioid dependence. The results show that higher perception of risk related to drug use is associated with lower odds of OUD. In a recent study, authors found a

statistically significant association between lifetime heroin use and a lower likelihood of reporting great risk of trying heroin (Votaw et al., 2017). From our study we can surmise that greater risk perception about overall drug dependence may deter individuals from misusing and abusing opioids.

Strengths and limitations

There are several notable strengths of this study. The NSDUH used a large nationally representative sample and the findings of this study are generalizable to the non-institutionalized US adult population. Moreover, the surveys used standard and validated tools for data collection. In addition, pooling four-years of data increased the sample size and the power of the current study.

However, the limitations of the study warrant discussion. First, due to the cross-sectional nature of the survey, the temporal relationship cannot be established between explanatory variables and OUD. As a result, causal relationships could not be inferred. Further prospective research is warranted to elucidate the causal association between various determinants on OUD among adults. Second, due to the self-reported data of opioid use and its associated factors, there is a possibility of underreporting or overreporting, which may result in underestimates or overestimates of the “true” association. Finally, since NSDUH collect data only on prescribed fentanyl, the OUD associated with fentanyl illicitly manufactured in clandestine laboratories may not be fully captured in this analysis (SAMHSA, 2019).

Conclusions

A multifaceted approach is needed to address the several factors that have positive associations with OUD. Tailoring interventions for White populations who have higher odds of OUD compared with other racial/ethnic groups may be beneficial in reducing OUD rates. Other populations, which should be considered for OUD interventions include men, those with lower education, who are unemployed, who have had a marijuana and alcohol use disorder, nicotine dependence, criminal justice involvement and had an MDE. Targeted behavioral and educational interventions for these at-risk populations are warranted for the prevention of OUD.

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Table 1.

Characteristics of adult US respondents with opioid use disorder: national survey on drug use and health (NSDUH) 2015–2018, (*N* = 171,766).

Characteristics	Total *N* = 171,766 %	Respondents with OUD* *N* = 1,859(0.9%) %	Respondents with no OUD *N* = 169,907 (99.1%) %	*p*-value
Age, in Years				<0.001
≥65	19.9	3.3	20.1	
18–25	14.0	19.2	13.9	
26–34	15.9	27.6	15.8	
35–49	24.8	27.9	24.7	
50–64	25.4	21.9	25.4	
Gender				<0.001
Female	51.8	40.9	51.9	
Male	48.2	59.1	48.1	
Race/Ethnicity				<0.001
Non-Hispanic White	64.1	72.5	64.0	
Non-Hispanic African American	11.8	10.6	11.9	
Non-Hispanic Other	8.2	5.2	8.2	
Hispanic	15.9	11.7	16.0	
Education				<0.001
College graduate or higher	31.3	13.7	31.3	
Less than high school	12.9	19.1	12.9	
High School	25.0	33.2	25.0	
Some college/Associate degree	30.9	34.0	30.9	
Marital status				<0.001
Never been married	28.4	50.1	28.2	
Married	51.9	26.7	52.2	
Widowed/separated/divorced	19.7	23.2	19.6	
Employment status				<0.001
Full-time	49.4	41.1	49.5	
Part-time	13.1	12.7	13.1	
Unemployed	4.4	13.4	4.3	

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Characteristics	Total *N* = 171,766 %	Respondents with OUD* *N* = 1,859(0.9%) %	Respondents with no OUD *N* = 169,907 (99.1%) %	*p*-value
Other	34.1	32.8	33.1	
Annual household income				<0.001
≥$75,000	37.6	22.8	37.8	
<$20,000	16.7	31.4	16.5	
$20,000–$49,999	29.7	32.1	29.7	
$50,000–$74,999	16.0	13.7	16.0	
Residence				0.120
Non-metro	14.2	15.6	14.2	
Large metro	55.9	52.7	55.9	
Small metro	29.9	31.7	29.9	
Health insurance				<0.001
Private insurance	64.9	3.7	65.1	
No insurance	9.9	19.2	9.8	
Medicaid/CHIP	10.2	30.2	10.1	
Medicare	7.6	7.3	7.6	
Tricare/CHAMPS/VA	5.2	3.3	5.2	
Other	2.2	3.6	2.2	
Physical health				<0.001
Bad	13.9	29.7	13.9	
Good	86.1	70.3	86.1	
History of criminal justice involvement				<0.001
No	98.6	83.3	98.7	
Yes	1.4	16.7	1.3	
Risk perception on addictive substance use				<0.001
No risk	19.3	45.1	19.1	
Slight risk	22.1	26.2	22.1	
Moderate risk	26.8	19.4	26.8	
Great risk	31.8	9.3	32.0	
Alcohol dependence/Abuse				<0.001
No	94.1	73.7	94.2	

Characteristics	Total *N* = 171,766 %	Respondents with OUD* *N* = 1,859(0.9%) %	Respondents with no OUD *N* = 169,907 (99.1%) %	*p*-value
Yes	5.9	26.3	5.8	
Marijuana dependence/Abuse				<0.001
No	98.6	85.2	98.7	
Yes	1.4	14.8	1.3	
Nicotine dependence				<0.001
No	92.5	52.7	92.8	
Yes	7.5	47.3	7.2	
Major depressive episode (MDE)				<0.001
No	93.1	71.2	93.2	
Yes	6.9	28.8	6.8	
Year				0.230
2018	25.3	23.2	25.3	
2017	25.1	24.2	25.1	
2016	24.9	25.1	24.9	
2015	24.7	27.5	24.7	

*OUD: Opioid Use Disorder.

Table 2.

Survey-weighted logistic regression model of opioid use disorder among adult population in the United States (N = 164,626).

Characteristics	Unadjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
Age, in Years				
≥65	1.00	–	1.00	–
18–25	8.42***	4.74–14.95	2.16	0.99–4.69
26–34	10.66***	5.96–19.01	3.83***	1.86–7.85
35–49	6.91***	3.86–12.39	3.60***	1.82–7.11
50–64	5.28***	2.92–9.53	3.10**	1.60–6.01
Gender				
Female	1.00	–	1.00	–
Male	1.55***	1.36–1.77	1.29**	1.11–1.48
Race/Ethnicity				
Non-Hispanic White	1.00	–	1.00	–
Non-Hispanic African American	0.79	0.58–1.07	0.66*	0.47–0.92
Non-Hispanic Other	0.56***	0.44–0.70	0.60**	0.45–0.80
Hispanic	0.65**	0.50–0.84	0.61**	0.45–0.83
Education				
College graduate or higher	1.00	–	1.00	–
Less than high school	3.41***	2.63–4.41	1.48**	1.05–2.08
High school	3.05***	2.32–4.01	1.50**	1.07–2.09
Some college/Associate degree	2.52***	1.92–3.30	1.43*	1.05–1.94
Marital status				
Never been married	1.00	–	1.00	–
Married	0.29***	0.24–0.34	0.67**	0.54–0.84
Widowed/separated/divorced	0.66***	0.55–0.80	0.92	0.72–1.17
Employment status				
Full-time	1.00	–	1.00	–
Part-time	1.16	0.94–1.44	1.00	0.76–1.32

Characteristics	Unadjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
Unemployed	3.73***	3.13–4.44	1.58***	1.27–1.96
Other	1.19*	01.01–1.41	1.15	0.89–1.49–1.68
Annual household income				
≥$75,000	1.00	–	1.00	–
<$20,000	3.14***	2.54–3.88	0.98	0.74–1.29
$20,000–$49,999	1.79***	1.45–2.21	0.90	0.69–1.19
$50,000–$74,999	1.41**	1.13–1.77	1.04	0.82–1.33
Residence				
Non-metro	1.00	–	1.00	–
Large metro	0.86	0.73–1.02	1.26**	1.06–1.50
Small metro	0.97	0.81–1.15	1.12	0.93–1.36
Health insurance				
Private insurance	1.00	–	1.00	–
No insurance	3.50***	2.86–4.29	1.62***	1.27–2.06
Medicaid/CHIP	5.35***	4.60–6.22	2.20***	1.80–2.69
Medicare	1.71**	1.26–2.31	1.51*	1.00–2.29
Tricare/CHAMPS/VA	1.12	0.76–1.65	1.08	0.71–1.63
Other	2.85***	1.92–4.24	1.91**	1.20–3.05
Physical health				
Bad	1.00	–	1.00	–
Good	0.38***	0.32–0.45	0.65***	−0.52–0.82
History of criminal justice involvement				
No	1.00		1.00	–
Yes	15.37***	13.15–17.96	4.74***	3.84–5.85
Risk perception on addictive substance use				
No risk	1.00		1.00	
Slight risk	0.50***	0.42–0.60	0.67***	0.55–0.82
Moderate risk	0.31***	0.25–0.38	0.57***	0.45–0.72
Great risk	0.12***	0.10–0.16	0.33***	0.24–0.44

Characteristics	Unadjusted odds ratio	95% CI	Adjusted odds ratio	95% CI
Alcohol dependence/Abuse				
No	1.00	–	1.00	–
Yes	5.82***	5.00–6.78	2.06***	1.67–2.54
Marijuana dependence/Abuse				
No	1.00	–	1.00	–
Yes	13.04	10.62–16.01	3.38***	2.63–4.35
Nicotine dependence				
No	1.00	–	1.00	–
Yes	11.64***	10.08–13.45	4.44***	3.67–5.37
Major depressive episode (MDE)				
No	1.00	–	1.00	–
Yes	5.58***	4.83–6.46	2.31***	1.88–2.85
Year				
2018	1.00	–	1.00	–
2017	1.05	0.85–1.30	1.01	0.80–1.28
2016	1.10	0.89–1.36	1.09	0.86–1.40
2015	1.21	0.98–1.51	1.19	0.94–1.50

* *p*-value < 0.05.

** *p*-value < 0.01.

*** *p*-value < 0.001.